U.S. Department
of Transportation

Federal Aviation Administration

Memorandum

Subject: **ACTION**: Request for Review and Concurrence with an Equivalent Level of Safety (ELOS) ACE-04-03, to 14 CFR part 23, 23.1145 Ignition switches, for the Thielert Supplemental Type Certificate to Install Thielert TAE-125-01 Diesel Engines in Certain Cessna 172 Series Airplanes.

Date: July 27, 2004

From: Cessna Program Manager, ACE-117W

Reply to Attn. of: Todd Dixon (816) 329-4146

To: Manager, Small Airplane Directorate, ACE-100

This memorandum documents concurrence for the subject finding of Equivalent Level of Safety (ELOS). We request your office to review and concur with the proposed ELOS finding to 14 CFR part 23, §23.1145, Ignition switches. The proposed ELOS will allow for the utilization of FADEC power switches in place of the function provided by ignition switches as described in §23.1145.

Background: The airplanes that the STC will apply to are the Cessna 172K, L, M, N, P, R and S. These are conventional airplanes currently powered by gasoline engines that utilize magneto ignition systems. Such conventional engine ignition systems can be shut off by ignition switches. The Thielert engine is a diesel cycle engine, and does not have or require an ignition system. However, it is controlled by a Full Authority Digital Electronic Engine Control, FADEC. Controlling electrical power to the FADEC has the same effect on the Thielert as utilizing ignition switches on a conventional engine; the engine can be shut off by shutting off FADEC power, accomplishing the same task as required for ignition switches in §23.1145. The applicant has requested, by submission of type design data and materials through the Luftfahrt-Bundesamt (LBA) of Germany, an ELOS for the provisions of 14 CFR part 23, §23.1145 Ignition switches, at Amendment 51.

While the LBA did not issue an ELOS or Special Condition for this paragraph, the Federal Aviation Administration (FAA) has determined that in intent and function of the diesel engine systems versus conventional gasoline engine systems, is different enough to warrant the issuance of an ELOS.

Applicable Regulations: The applicable regulation is 14 CFR part 23, §23.1145 which states:

§ 23.1145 Ignition switches.

(a) Ignition switches must control and shut off each ignition circuit on each engine.

(b) There must be means to quickly shut off all ignition on multiengine airplanes by the grouping of switches or by a master ignition control.

(c) Each group of ignition switches, except ignition switches for turbine engines for which continuous ignition is not required, and each master ignition control must have a means to prevent its inadvertent operation.

Compensating Features:

The Thielert TAE-125 reciprocating diesel engine uses a FADEC to control engine operation and by its natures does not require the associated ignition systems and switches. However, the FADEC can be shut off, which will stop the engine, and a switch provides such a feature. This feature meets the intent of §23.1145. To ensure an ELOS to the intent of §23.1145 the STC meets the requirements of §23.1145, when the regulation is recharacterized to mean "FADEC power switch" in place of "ignition switch", and it meets all requirements as specified in §23.1145. This provides an equivalent level of functionality and safety as intended by the rule for conventional ignition systems as used on gasoline engines.

Recommendation: We concur that the use of FADEC power switches to accomplish the requirements of §23.1145 provides an ELOS to that intended by §23.1145 and recommend the issuance of this ELOS.

Concurred by:

S.M. Nagarajan	7-15-04
For Manager, Project Support Branch, ACE-112	Date
Scott Sedgwick	7-19-04
Manager, Standards Office, ACE-110	Date
William J. Timberlake	7-27-04
For Manager, Small Airplane Directorate, ACE-100	Date